

Broad-Band Characteristics of Capacitive Button Pickups*

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A broad-band theory of the circular capacitive button pickup is presented. Expressions for the longitudinal and transverse transfer impedance of a pair of such pickups are derived in the frequency and time domains. The broad-band expressions are shown to reduce to the standard electrostatic transfer functions for wavelengths large compared to the button diameter. The theory is shown to be in good agreement with short pulse measurements performed on standard LEP button electrodes. In particular, the theory explains a resonance in the response of the LEP buttons which made them unsuitable in standard form for their intended application as pickups in the LBL Advanced Light Source feedback system. The buttons were modified to suppress the resonance and subsequently incorporated into the feedback system.

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